

Welch (W^m M.)

al

A Statistical Record of Five
Thousand Cases of Small-pox.

BY

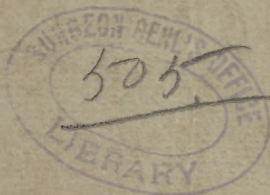
WILLIAM M. WELCH, M. D.,

Physician in charge of the Municipal Hospital for In-
fectious Diseases, Philadelphia.

REPRINTED FROM THE

New York Medical Journal

for March 17 and 24, 1894.



*Reprinted from the New York Medical Journal
for March 17 and 24, 1894.*



A STATISTICAL RECORD OF
FIVE THOUSAND CASES OF SMALL-POX.*

BY WILLIAM M. WELCH, M. D.,

PHYSICIAN IN CHARGE OF THE MUNICIPAL HOSPITAL FOR INFECTIOUS DISEASES,
PHILADELPHIA.

RECOGNIZING the difficulty of interesting an audience by the narration of statistics simply, I have concluded to present the facts which I have to offer somewhat after the style of an object lesson. I shall mention but few facts that can not be seen clearly illustrated in the tables hanging before you.

Before calling your attention to these tables I should say that the opportunity to study and classify these five thousand cases of small-pox was afforded me in the Municipal Hospital for Infectious Diseases of Philadelphia during the period from 1870 until the early part of the present year. This period includes several epidemics of the disease, some of which were of considerable magnitude and great virulence, notably the epidemic of 1871-'72, which was almost world-wide and everywhere marked by

* Read before the First Pan-American Medical Congress, September, 1893.

unusual malignancy. During such visitations of the disease a very large proportion of the more severe and malignant cases were found among the admissions to the hospital. This is owing to two facts: first, since removal of patients to the hospital was not compulsory, most of the milder cases were treated at their homes; and, secondly, that a very large proportion of the patients were received from the lower class of society with constitutions exhausted or depraved by intemperance and other depressing habits. Even many of these were not received until all hope of recovery had passed. During the epidemic of 1871-'72 as many as a hundred and twenty-eight patients died in less than forty-eight hours after admission, while, indeed, a few others died in the ambulance on their way to the hospital, and all such are, of course, included in the statistics to be submitted.

I mention these facts in explanation of the unusually high death-rates to be seen in the tables. But while the death-rates are unusually high there is no disproportion in this respect between the vaccinated and the unvaccinated cases. That is to say—if the death-rate is excessively high in the one, it is to an equal degree excessively high in the other. There will therefore be no difficulty in measuring by these statistics the value of vaccination as a protective or modifying agent in small-pox.

This first table to which I shall call attention is one showing the cases classified accordingly as the disease was unmodified or modified. The former type, of course, is designated variola, and the latter varioloid, while the term small-pox, whenever used, must be understood as including both.

All unvaccinated cases, all malignant cases, and all vaccinated cases in which the eruption advanced to the pustular stage and was attended by well-marked secondary

TABLE I.—*Showing the Cases divided into Variola and Varioloid.*

DISEASE.	Admitted.	Died.	Per cent. of deaths.
Variola.....	2,831	1,534	54·18
Varioloid.....	2,169	28	1·29
Total.....	5,000	1,562	31·24

or suppurative fever have been classified in this table as variola, while all the vaccinated cases in which the eruption was markedly abridged in its course and in which there was little or no secondary rise of temperature have been classified as varioloid. Under such a classification, a fatal result never occurs from the latter, except in greatly enfeebled constitutions or when some complication arises. While the death rate was 54·18 per cent. from variola, it was only 1·29 per cent. from varioloid.

TABLE II.—*Showing the Cases classified according to the Sex of the Patients.*

SEX.	Admitted.	Died.	Per cent. of deaths.
Male.....	3,261	1,031	31·61
Female.....	1,739	531	30·54
Total.....	5,000	1,562	31·24

The table shows that a considerably larger number of males than females was admitted to the hospital; and also that there is practically no difference between the death-rates of the two sexes.

Although the preponderance of cases is on the side of males, yet it can not be said that sex exerts any influence whatsoever over susceptibility to small-pox, nor that the dis-

ease, all things being equal, is more fatal among one than the other. It is true that men are more frequently addicted to intemperance, and that this habit predisposes to malignancy of the disease; but, on the other hand, pregnancy in women is very liable to be followed by abortion, and when this accident occurs it always proves to be a very serious complication.

TABLE III.—*Showing all the Cases classified according to the Color of the Patients.*

COLOR.	Admitted.	Died.	Per cent. of deaths.
White.....	4,200	1,221	29·07
Black.....	800	341	42·62
Total.....	5,000	1,562	31·24

It is generally believed that small-pox is more fatal among colored persons than among whites, and the above table seems really to support such a belief; but before a reliable conclusion can be arrived at it is necessary that the patients of both colors should be observed under precisely the same circumstances—that is to say, comparison should be made between the unvaccinated of each color. Such a comparison may be seen in the following table:

TABLE IV.—*Showing the Unvaccinated Cases of Small-pox, classified according to the Color of the Patients.*

UNVACCINATED.	Admitted.	Died.	Per cent. of deaths.
White.....	1,173	681	58·05
Black.....	439	257	58·54
Total.....	1,612	938	58·18

Reference to the last two tables shows that of the two classes of patients—white and black—a very much larger

proportion of the blacks were unvaccinated; of course, that accounts for the greater percentage of deaths among this class in the former table. In the latter table, however, where a comparison can be made between the unvaccinated of each color, it is seen that there is practically no difference in the death-rates, the deaths among the whites being at the rate of 58·05 per cent. and among the blacks 58·54 per cent.

I would not presume to say that all authors who contend that small-pox is more fatal among negroes than whites are mistaken in regard to their observations, but I wish to emphasize what I have already said—that no conclusion on this point is reliable unless both of these classes of patients have been observed under precisely the same circumstances.

TABLE V.—*Showing the Cases classified according to the Vaccine Condition of the Patients.*

	Admitted.	Died.	Per cent. of deaths.
Vaccinated in infancy, good cicatrices...	1,412	124	8·78
“ “ “ fair cicatrices...	666	98	14·71
“ “ “ poor cicatrices...	1,070	290	27·10
Post-vaccinal cases.....	3,148	512	16·26
Unvaccinated cases.....	1,759	1,027	58·38
Unclassified cases.....	93	23	24·73
Total.....	5,000	1,562	31·24

In this table a comparison may be made between the vaccinated and the unvaccinated cases. For reasons already stated, the proportion of deaths in both is excessively high. Among the unvaccinated the death-rate is as high as 58·38 per cent., and among the vaccinated, as a whole, 16·26 per cent. Although high in both cases, the difference between the death-rates is very striking. If the 1,759 un-

vaccinated persons had been vaccinated in infancy, like the others, instead of 1,027 deaths among this class, there would have been only 286, a saving of 738 lives. Vaccination would have accomplished even more than this for these patients: it would have so modified the disease in a large proportion of those that recovered as to prevent much suffering and save them from disfigurement for life.

In examining the vaccine cicatrices of a large number of persons it is found that these scars differ considerably in appearance, and the question naturally arises, Can protection be measured to any degree by the different characteristics which they present? There is no doubt that many persons with quite inferior vaccine marks are fairly well protected, or even enjoy immunity from small-pox, while many with typical marks prove to be susceptible to the disease, and indeed often perish from it. But such results must, I feel sure, be regarded as exceptions to the rule. When a large number of patients are examined and the results tabulated, as the above table shows, the degree of protection, as indicated by the death-rates, is found to bear a very close and direct relation to the character of the vaccine cicatrices.

All of the patients represented in the tables were carefully examined on their admission to the hospital, and the number and character of their vaccine scars at once recorded. At this time it was, of course, generally impossible to foretell the final result. The scars were divided, according to their quality, into three grades, which are designated in the tables by the terms *good*, *fair*, and *poor*. Under the first head I have classified all cases presenting typical vaccine cicatrices—that is to say, cicatrices which are distinctly excavated, with well-defined margins, reticulated or foveolated, and altogether presenting the appearance of having been stamped into the skin by a sharply cut die.

Under the second head I have classified all cases with scars having the same general characteristics, though much less distinctly marked. Under the third head have been classified all cases having scars which were said to have been the result of vaccination, but which in very many instances were so indistinct or uncharacteristic as to make it difficult, and sometimes even impossible, to recognize them as vaccine scars.

The cases classified under the heads of both *good* and *fair* marks had all, doubtless, passed through a well-marked, or reasonably well marked, course of vaccina in infancy. The death-rates are respectively 8·78 and 14·71 per cent. But I am strongly of the opinion that very many of the cases classified under the head of "poor cicatrices" were never successfully vaccinated. Very often I felt fully convinced at the time of making the examination and recording the vaccine condition that such was the case, but, as the patients insisted that they had been vaccinated, I could not reject their testimony without being considered, especially by the enemies of vaccination, a partial judge. It certainly does not detract from the reputation of vaccination to know that when the vaccine process is irregular, imperfect, or spurious the protection is diminished or absent. As the mean death-rate of the cases showing *good* and *fair* cicatrices is 10·68 per cent., and the death-rate of those showing *poor* scars is 27·10 per cent., it is evident that not only very many of the latter had been imperfectly vaccinated, but that a large number had never been subjected at all to the vaccine process.

It is impossible to illustrate in this table the very striking and conclusive evidence of the protective power of vaccination that frequently came under my notice while observing these five thousand cases of small-pox—such, for instance, as witnessing, on the one hand, an unvaccinated

person suffering from the confluent form of the disease, loathsome and offensive, with the final issue for several days uncertain, and on the other hand a vaccinated person undergoing a modified form of the disease, so mild and innocent in its character as not to excite any apprehension for the safety of the patient. In the former case, if recovery took place, the individual was left disfigured for life, while in the latter, after a few months had passed, there was but little, if anything, in the appearance of the individual to indicate that he had ever suffered from the disease at all.

Also, I have seen over and over again entire families brought into the hospital when all the unvaccinated children have been suffering from small-pox and the vaccinated children unaffected; have seen the former perish and the latter remain exempt from the disease, although living, eating, and sleeping in the infected atmosphere for several weeks. But I have yet to see a single unvaccinated child escape the disease under similar circumstances. Furthermore, I have more than once seen a vaccinated infant draw its daily supply of nourishment from a mother suffering from varioloid, and the infant remain as free from any symptom of the disease as if the infection were a thousand miles away and the food were received from a most wholesome source. All this is evidence of the prophylactic power of vaccination that can not be shown in mortality tables.

Under the head of "unclassified cases" in the last table are included quite a large number of patients who were vaccinated after exposure to the variolous infection, and also a few patients who died and were buried before an examination as to their vaccine condition could be made.

The next table to which I shall direct attention is one illustrating the comparative efficacy of vaccination as per-

formed in various countries, especially in the United States, Germany, and Ireland.

TABLE VI.—*Showing the Cases classified as to Nationality of the Patients and their Vaccine Condition.*

	Admitted.	Died.	Per cent. of deaths.
UNITED STATES :			
Not vaccinated.....	1,457	831	57·03
Vaccinated in infancy, good mark....	686	53	7·72
“ “ “ fair mark.....	375	53	14·13
“ “ “ poor mark.....	594	168	28·52
Post-vaccinal cases.....	1,655	274	16·49
GERMANY :			
Not vaccinated.....	59	34	57·62
Vaccinated in infancy, good mark....	345	33	9·56
“ “ “ fair mark.....	157	19	12·10
“ “ “ poor mark.....	250	47	18·80
Post-vaccinal cases.....	752	99	13·16
IRELAND :			
Not vaccinated.....	168	112	66·66
Vaccinated in infancy, good mark....	212	18	8·49
“ “ “ fair mark.....	57	15	26·31
“ “ “ poor mark.....	130	53	40·76
Post-vaccinal cases.....	399	86	21·55
OTHER NATIVITY :			
Not vaccinated.....	64	41	64·06
Vaccinated in infancy, good mark....	164	18	10·97
“ “ “ fair mark.....	75	10	13·33
“ “ “ poor mark.....	95	21	22·10
Post-vaccinal cases.....	334	49	14·67
UNKNOWN :			
Not vaccinated.....	11	9	81·81
Vaccinated in infancy, good mark....	5	2	40·00
“ “ “ fair mark.....	2	1	50·00
“ “ “ poor mark.....	1	1	100·00
Post-vaccinal cases.....	8	4	50·00

Perhaps I should explain, in the first place, that the high rate of mortality exhibited under the head of "unknown" nativity is owing to the fact that many of the patients therein represented were foreigners apparently, and were received into the hospital in a moribund state, so that it was impossible to learn their nationality. I may add also that under the head of "other nativity" are included the patients who were natives of the various countries of the globe not designated in the table, excepting China and Japan, which countries furnished no patients.

Referring to the table, it is seen that under the three nationalities therein given the death-rates of the unvaccinated cases of the United States and Germany do not differ materially, but the death-rate of the unvaccinated cases of Ireland is very much the highest. A comparison of the post-vaccinal cases also shows that the vaccinated patients of Irish birth have perished in the largest proportion. This seems to indicate that small-pox is most fatal among the Irish—a fact which, I believe, I have noticed in every epidemic of the disease that I have witnessed.

The difference between the rates of mortality among the cases showing "good" marks, as is seen under the three nationalities mentioned, is not great, and the slight difference that does exist may be entirely accidental. But the difference between the death-rates of those showing "poor" marks is very great and decidedly in favor of the patients of German birth. The vaccinations performed in Germany prove to be more uniformly protective, and hence the death-rate among the post-vaccinal cases under this head is the lowest of any of the nationalities. All this seems to prove that vaccination is most efficaciously performed in Germany. The comparative exemption of Germany and the German army from small pox is simply a striking example of the brilliant result of careful and efficient vaccination.

When most of the vaccinations represented in the table were performed it was customary in the United States, and in Ireland also, I believe, to use humanized crusts; but in Germany fresh eighth-day lymph or arm-to-arm vaccination was the means or method employed, and this method has always given the very best results. Hence I think it is not improbable that the German patients owe their better protection to the superior quality of the vaccine lymph generally employed in their country.

There is another explanation that might be offered to account for the superior protection enjoyed by the German patients—namely, that it is the practice in Germany in performing vaccination to make numerous insertions of the vaccine virus. In examining the arms of patients of German birth it is quite common to find three distinct scars on each arm, and even a greater number is frequently met with. I have seen as many as twenty typical vaccine marks on the arms of a German patient. If multiple insertions of the vaccine lymph increase the protection against small-pox—and statistics are not wanting to show that such is the case—surely German subjects should be well protected. But, in view of the facts which will appear in the following table, I am inclined to believe that the Germans owe their superior protection from small-pox more to the quality of the vaccine virus they use than to the number of insertions they make.

The first thing to be seen in this table is that there is practically no difference between the death-rates of the unvaccinated patients and those professing to have been vaccinated but showing no visible mark. This proves that there was either a mistake as to the alleged fact or that a vaccination which is followed by no mark is devoid of protective power, most probably the former.

TABLE VII.—*Showing the Cases classified as to the Number and Character of the Vaccine Scars borne by each Patient.*

	Admitted.	Died.	Per cent. of deaths.
Unvaccinated.....	1,512	881	58·26
Professing to have been vaccinated, but no visible mark *.....	247	146	59·10
Vaccinated seven days and less prior to the appearance of the variolous eruption..	57	25	43·86
Vaccinated longer than seven days prior to the appearance of the variolous eruption.....	74	15	20·27
Vaccinated in infancy, one good mark ..	787	70	8·89
“ “ “ “ fair mark ...	430	67	15·58
“ “ “ “ poor mark...	850	252	29·64
Total number showing one mark ...	2,067	389	18·81
Vaccinated in infancy, two good marks..	265	20	7·54
“ “ “ “ fair marks..	105	14	13·33
“ “ “ “ poor marks..	94	22	23·40
Total number showing two marks ..	464	56	12·06
Vaccinated in infancy, three good marks.	119	10	8·40
“ “ “ “ fair marks .	45	4	8·88
“ “ “ “ poor marks.	49	13	26·53
Total number showing three marks .	213	27	12·67
Vaccinated in infancy, four or more good marks.....	247	24	9·74
Vaccinated in infancy, four or more fair marks.....	80	10	12·50
Vaccinated in infancy, four or more poor marks.....	97	11	11·34
Total number showing four or more marks.....	424	45	10·61

* The cases classified in this table as claiming to have been vaccinated, but showing no visible mark, are included in the other tables among the unvaccinated. So, also, quite a number of those classified in this table as having been vaccinated during the incubation period of small-pox are included among the vaccinated or unvaccinated in some other tables, which fact will explain some discrepancies in numbers.

The table also shows that vaccination practiced after exposure to the infection of small-pox may afford considerable protection against the disease. If it be performed within two or three days after the infection has been received into the system it is possible for the protection to be absolute. I have seen as many as twenty-eight children perfectly protected from small-pox by vaccination during the incubation period.* But if the vaccination be performed much less than seven days before the eruption of small-pox appears, no modifying influence will be exerted. In a considerable number of the cases included in the table under the head of "vaccinated seven days and less prior to the appearance of the variolous eruption" the patients had been vaccinated no longer than from two to four days before the eruption appeared, while a somewhat larger number had been vaccinated as long as from four to seven days before it appeared. Taking the whole number of cases under this head, it is seen that the death-rate is 43·86 per cent., while among the unvaccinated it is as high as 58·18 per cent. This shows that considerable protective influence must have been exerted by vaccination performed during that period. But a still greater influence was exerted among the cases included under the succeeding head, where vaccination is represented as having been performed longer than seven days before the small-pox eruption appeared. The death-rate here is only 20·27 per cent.

In regard to the matter of estimating the efficacy of vaccination by the number of vaccine cicatrices borne by each person, the table can not be said to support the views of most authors, nor does it accord with the experience of some other observers. It is, indeed, in striking contrast with the evidence on this point collected by Mr. Marson and

* For further information on this subject see my paper on Vaccination during the Incubation Period of Variola, published in the *Transactions of the Ninth International Medical Congress*, vol. iv, p. 160.

tabulated by Mr. Simon. According to these authors, who derived their data from six thousand post-vaccinal cases of small-pox, the mortality-rate among patients having one vaccine scar was 7.5 per cent. ; having two, 4.125 per cent. ; having three, 1.75 per cent. ; having four or more, 0.75 per cent. Where the vaccine scars were all well marked or typical, the loss by death is said to have been even less than is here indicated.

The table shows, it is true, that the highest death-rate is among the patients having but one vaccine mark, but unquestionably this is owing to the fact that a very much larger proportion of the patients under this head than under any other showed "poor" marks, and, as already pointed out, very many of these patients would be more correctly classified if counted among the unvaccinated cases. Those having four or more "poor" marks are in a much smaller ratio to the total number of post-vaccinal cases under that head than under any other, and the death-rate, to be sure, is remarkably low. It is, indeed, almost as low as among those showing four or more "good" marks. The explanation of the low death-rate here is that nearly all the patients classified under this head were natives of Germany, where, as already shown, vaccination is so efficiently performed that if the scars are not in every respect typical there is, nevertheless, well-marked protection.

Referring again to the table, it is seen that, where the vaccine scars are typical, there is no relation between the number of such scars and the degree of protection conferred against small-pox. Indeed, it so happens in the table that the death-rate among the patients having but one "good" mark is a little lower than among those having four or more "good" marks. There is no doubt that vaccina characterized by a single typical vesicle destroys in the individual all susceptibility to small-pox, and it would

be impossible for multiple vesicles to do more than that. As a safeguard against failure, however, or when using long-humanized virus, it is advisable to make several insertions; but I must repeat that it is my positive conviction that quality of vaccine lymph has far more to do with securing efficient vaccination than multiple insertions have.

In the next table is illustrated, first, the efficacy of recent vaccination as performed in infancy, and, secondly, the gradual loss of vaccine protection as the individual grows older:

TABLE VIII.—*Showing the Cases classified as to Age Periods of the Patients, and also as to their Vaccine Condition in each of these Periods.*

	Admitted.	Died.	Per cent. of deaths.
UNDER ONE YEAR:			
Unvaccinated.....	78	57	73·07
Vaccinated.....	2	....	.....
ONE TO SEVEN YEARS:			
Unvaccinated.....	404	208	51·48
Vaccinated in infancy, good mark....	10	....	.....
“ “ “ fair mark.....	10	1	10·0
“ “ “ poor mark.....	15	1	6·66
Total number vaccinated.....	35	2	5·70
SEVEN TO FOURTEEN YEARS:			
Unvaccinated.....	222	71	31·98
Vaccinated in infancy, good mark....	55	2	3·63
“ “ “ fair mark.....	23	2	8·69
“ “ “ poor mark.....	59	9	15·25
Total number vaccinated.....	137	13	9·48
FOURTEEN YEARS AND UPWARD:			
Unvaccinated.....	1,038	681	65·60
Vaccinated in infancy, good mark....	1,344	122	9·07
“ “ “ fair mark.....	629	93	14·78
“ “ “ poor mark.....	994	280	28·16
Total number vaccinated.....	2,967	495	16·68

It can not be questioned that, in a large city like Philadelphia, where gratuitous vaccination is provided for the poor and improvident class of the community, there must be a very much larger number of children under one year old vaccinated than unvaccinated, and yet it is seen by the table that seventy-eight of the latter were admitted to the hospital, and only two of the former. The unvaccinated perished in the proportion of 73.07 per cent., while both of the vaccinated of course recovered. One of the vaccinated children was eleven months old; had been vaccinated two months previously; showed a good cicatrix; had varioloid in an exceedingly mild form, the eruption consisting of only six small vesicles; and the child was at no time scarcely ill at all. The other vaccinated case had the disease so indistinctly marked that, following the diagnosis of varioloid as recorded in the *Record Book*, I find a mark of interrogation, which, interpreted, means that the diagnosis was somewhat doubtful. These facts show that small-pox among unvaccinated children under one year old is very common and fatal; also that among vaccinated children at this age the disease is very rare, and, when it occurs at all, it is no more to be feared, so far as danger to life is concerned, than ordinary vaccina.

In children between the ages of one and seven years small pox is, of course, very common among the unvaccinated, and occasionally it is seen in a very mild form among the vaccinated; but death never results where there is evidence of thorough vaccination, except from some serious complication. It is seen in the table that one death occurred under the head of "fair" vaccine mark. In this case the child was about a year old, a foundling, badly nourished, having disordered digestion, and was very feeble. The eruption consisted of only a very few small vesicles. Death resulted from sheer debility. Very little need be

said of those classified under the head of "poor" vaccine scars, as the vaccination in all such cases was either imperfect or spurious.

In the next age period—seven to fourteen years—it is worthy of note that the death-rate among the unvaccinated cases is very much lower than at any of the other age periods. Possibly the explanation of this is that the recuperative powers of life are most active at that age, or that some of the depressing habits common in later life, such as intemperance and the like, have not yet been formed. At this period of life post-vaccinal cases of small-pox increase considerably, and occasionally death occurs from the disease, even after quite thorough infantile vaccination. These facts clearly indicate that the vaccination of infancy is apt to lose at this period more or less of its protective power.

The last age period noted in the table—fourteen years and upward—illustrates, in the first place, how large is the number of youths and adults who have never enjoyed the prophylactic power of vaccination. Among this class, too, the death-rate is seen to be considerably higher than that of the corresponding class in either of the two preceding age periods. The table also proves in a very indubitable manner, by the great increase of post-vaccinal cases of small pox at this age period, that vaccination in infancy can not be depended upon to confer protection against the disease in the later life of the individual. There are therefore two important facts prominently brought forward in this table: First, that recent vaccination confers absolute, or almost absolute, protection against small-pox, and, secondly, that when vaccination has been performed in infancy revaccination is required at, if not before, the age of puberty.

My experience leads me to place implicit confidence in the efficacy of revaccination, although the statistics pre-

sented in Table IX are somewhat vague and indefinite, and do not therefore fully or clearly demonstrate the real merits of the measure. The table simply contains the relevant data as obtained from the patients who claimed to have been vaccinated in infancy and subsequently revaccinated, together with the general results.

In tabulating the cases represented in Table IX I have been obliged to accept the statements of the patients, first, as to the fact of revaccination, and, secondly, as to the time when it was performed. Their testimony as to whether or not it was successful I have found very unreliable. To use their own language, they often said "it took a little" or "the arm was very sore," and frequently they did not remember whether it "took" at all, but would point to a mark which they said they had always believed was the result of revaccination. Not infrequently marks were pointed out as the result of revaccination which were an exact counterpart of one or more other marks present on the arm, and which were known to have resulted from the primary vaccination. It is evident, therefore, that it would be very difficult to say how many of the cases recorded in the table should be regarded as authentic examples of small-pox occurring after successful revaccination. Some, I think, should be so regarded.

The more positive evidence of the efficacy of revaccination is to be found in the fact that persons recently revaccinated with effect do not take small-pox when freely exposed to the infection. During my service of twenty-three years no resident physician of the hospital, no nurse, laundress, cook, or any other employee who was properly revaccinated before entering on duty has taken small pox. Perhaps I should except a female nurse who was revaccinated on the first day of her residence in the hospital with almost typical result. In the course of about two weeks I noticed on

the forehead of this nurse, near the edge of her hair, one or two variolous vesicles, which were preceded by but little if any febrile disturbance. At any rate, she was at no time disabled from performing her usual duties.

What vaccination has done for these employees, whose duties have necessarily brought them in the closest possible contact with the infection of small-pox, it will do for any or all who fully avail themselves of its protective influence. I am firmly of the opinion that if all persons were properly vaccinated in infancy and again at the age of puberty Jenner's prediction as to the power of this agent to extirpate small-pox from the globe would soon be realized.

In Table X, the last table which I shall present, are contained the principal data at hand in regard to the cases or alleged cases of second attacks of small-pox. There is found in it also the same element of uncertainty as to the authenticity of many of the cases as existed in the preceding table, though perhaps to a less degree, and this uncertainty is owing to the same cause—namely, the unreliability of evidence furnished by the patients.

It is certain that very many of the cases recorded in Table X should not be regarded as true cases of recurrent small-pox. For instance, where it is seen that a small-pox patient has never been vaccinated, shows little or no pitting, and is suffering from an unmodified form of the disease, it is more than probable that there has been no previous attack. Slight pitting, when present, is not necessarily proof of such an attack having existed, for the pitting may have resulted from chicken-pox, which disease, I well know, is often mistaken for small-pox. So also all those cases having a history of thorough vaccination in infancy, if characteristic pitting of the alleged previous attack is absent, should be regarded as very doubtful cases of recurrent small-pox. It would be very exceptional in-

deed for a person first to take vaccina, then small-pox, and subsequently a second attack of the disease.

There is no doubt that a few of the cases recorded in the table should be regarded as genuine second attacks of small-pox, but in most such cases the disease was exceedingly mild—so mild, indeed, in some instances as scarcely to be recognizable. I have never yet seen an unmodified, or even a severe, case of small-pox occur in a person who was deeply and characteristically pitted from a previous attack. Such cases I know may be found on record, but it has not been my fortune to meet with them. I might say, furthermore, that during my many years of service no person has been admitted to the hospital twice suffering from any form of the variolous disease. In view of all these facts, I can not help believing that second attacks of small-pox are much rarer than is generally supposed.

821 NORTH BROAD STREET.

TABLE IX.—Showing the Cases occurring in Patients after alleged Revaccination.

No.	Age.	Character of marks from vaccination in infancy.	Character of marks from the alleged revaccination.	Length of time since the alleged revaccination.	Disease.	Result.	No. of days in hospital.	Remarks.
1	45	Poor.	Doubtful.	31 years.	Varioloid.	Recovery.	23	Eruption very light, mostly papular; patient not confined to bed.
2	23	"	Fair.	6 to 8 years.	"	"	7	Disease very mild.
3	65	"	Poor.	24 years.	"	"	8	
4	34	Fair.	Doubtful.	9 years.	Confluent variola.	"	77	
5	23	Poor.	"	13 years.	Varioloid.	"	7	
6	20	"	"	4 weeks.	Variola.	Death.	14	
7	21	"	"	11 years.	Varioloid.	Recovery.	19	
8	27	Fair.	Fair.	8 years.	Variola.	"	28	
9	20	Good.	Good.	10 years.	Varioloid.	"	6	Disease very mild.
10	23	"	Poor.	Since puberty.	"	"	19	Eruption consists of about six vesicles.
11	24	Fair.	Doubtful.	3 months.	Variola.	"	19	
12	19	Poor.	Very poor.	4 weeks.	Varioloid ?	"	4	Eruption only papular, disappearing in two or three days.
13	20	Good.	Invisible.	2½ years.	Variola.	Death.	4	Does not give a very intelligent account of revaccination; case hemorrhagic.
14	26	"	Good.	14 years.	Varioloid.	Recovery.	7	Eruption very light; only slightly vesicular.
15	23	Poor.	Invisible.	10 years.	"	"	24	The variolous eruption so mild as to be of a doubtful character.
16	26	Good.	Good.	2 months.	Varioloid ?	"	2	Eruption very mild; three months pregnant. Abortion threatened, but did not occur while in hospital.
17	22	Poor.	Fair.	7 years.	Varioloid.	"	7	Eruption so mild as to be of doubtful character.
18	24	Good.	Poor.	9 years.	Varioloid ?	"	21	
19	35	Poor.	Invisible.	21 years.	Varioloid.	"	11	
20	37	Fair.	Fair.	21 years.	"	"	21	Eruption very light.
21	20	Good.	Poor.	1 month.	"	"	9	
22	44	"	"	6 years.	"	"	14	
23	24	Fair.	"	6 weeks.	"	"	11	
24	17	Good.	"	4 months.	"	"	15	
25	24	"	"	2 months.	"	"	11	
26	17	Fair.	Fair.	3 months.	"	"	9	
27	29	"	Fair.	6 months.	"	"	26	
28	18	Good.	Scarcely visible.	6 months.	Variola.	"	33	Eruption consists of only a few papules, which did not become vesicles.
29	35	Poor.	Uncertain.	16 years.	Varioloid.	"	26	All marks have the appearance as if from primary vaccination.
30	52	Fair.	Invisible.	5 years.	Variola.	"	51	
31	35	Good.	Fair.	2½ years.	Varioloid.	"	18	Says was exposed to the infection of small-pox shortly after revaccination, but did not take the disease then.
32	24	"	Invisible.	7 years.	Variola.	Death.	4	Claims to have been revaccinated at seventeen years of age, but no scar resulted.
33	24	"	Fair.	8 years.	Varioloid.	Recovery.	10	Disease very mild.
34	26	"	Poor.	4 years.	"	"	20	
35	48	Poor.	"	14 years.	"	"	23	
36	30	Fair.	Fair.	14 years.	Variola.	"	64	
37	19	Good.	Poor.	5 years.	Varioloid.	"	19	
38	40	"	"	13 years.	"	"	7	
39	44	Poor.	"	15 years.	"	"	11	
40	36	Good.	Good.	14 years.	"	"	19	
41	34	Poor.	Poor.	18 months.	"	"	19	
42	36	Good.	Fair.	3½ years.	"	"	19	
43	58	Poor.	Not characteristic.	16 years.	"	"	16	
44	24	Fair.	Poor.	14 years.	"	"	14	
45	16	Very poor.	Very poor.	1 year.	"	"	14	Eruption very light.
46	57	Fair.	Poor.	37 years.	"	"	12	Eruption very light.
47	19	Poor.	Not characteristic.	2 years.	"	"	10	
48	23	Good.	"	17 years.	Variola.	Death.	18	Case hemorrhagic; complicated also by disease of the brain.
49	25	Poor.	Poor.	9 years.	"	"	8	Eruption confluent.
50	40	Invisible.	"	17 years.	"	"	15	Eruption confluent; gangrenous inflammation of right arm.
51	33	Poor.	Invisible.	9 years.	Varioloid.	Recovery.	16	Eruption very light.
52	19	"	Good.	9 years.	Variola.	"	69	
53	23	Good.	Fair.	10 months.	Varioloid.	"	9	Very mild case.
54	35	Very poor.	Very poor.	6 years.	Variola.	Death.	6	Eruption confluent and flat.
55	46	Good.	Fair.	19 years.	Varioloid.	Recovery.	21	
56	46	Very poor.	Very poor.	18 years.	"	Death.	3	Suffering also from chancre.
57	56	Poor.	Poor.	4 years.	"	Recovery.	22	
58	27	Invisible.	Good.	12 years.	"	"	20	
59	54	Very poor.	Doubtful.	32 years.	"	"	38	
60	25	Fair.	Poor.	13 years.	"	"	13	
61	35	Good.	Very poor.	10 years.	"	"	18	
62	38	Very poor.	Poor.	8 years.	"	"	26	
63	26	Good.	Not recorded.	16 years.	"	"	11	Eruption consists of about twelve vesicles, which are scarcely characteristic.
64	35	Fair.	Not characteristic.	19 years.	Variola.	Death.	6	Hamorrhagic tendency.
65	40	Indistinct.	Indistinct.	9 years.	Varioloid.	Recovery.	17	Disease very mild.
66	36	Good.	Poor.	18 years.	Variola.	Death.	11	Eruption intensely confluent.
67	38	Fair.	Very poor.	10 years.	Varioloid.	Recovery.	42	Two months pregnant.
68	30	Poor.	Poor.	2 years.	"	"	12	
69	48	Good.	Good.	22 years.	"	"	32	
70	40	"	Fair.	31 years.	"	"	26	
71	22	Poor.	"	4 years.	"	"	15	
72	26	Good.	Poor.	9 years.	"	"	7	Disease very mild.
73	45	Poor.	"	5 or 6 years.	"	"	41	Says was vaccinated when an infant and again at five or six years of age, but does not know which scar belongs to the former or which to the latter.
74	29	Good.	Very poor.	5 or 6 years.	"	"	19	Says the revaccination took only slightly.
75	40	"	Good.	4 years.	"	"	92	
76	53	Fair.	Poor.	7 years.	"	"	22	
77	24	Good.	Good.	10 or 11 years.	"	"	36	
78	40	Fair.	Poor.	17 years.	"	"	27	Disease very mild.

TABLE X.—*Showing the alleged Cases of Second Attacks of Small-pox.*

No.	Present age of patient.	Age at which the alleged previous attack occurred.	Whether or not vaccinated prior to the alleged previous attack.	Character of the vaccine mark.	Extent of pitting.	Type of present attack.	Result.	Remarks.
1	35	6 years.	Not vaccinated.	.....	Very little.	Greatly modified.	Recovery.	Was confined to bed only during the initial stage.
2	31	Childhood.	Vaccinated.	Poor.	"	Very mild.	"	Was confined to bed only during the initial stage.
3	22	"	"	"	"	"	"	So mild as to be a doubtful case of varioloid.
4	49	"	Not vaccinated.	.....	No pitting.	Unmodified.	"	
5	49	10 years.	Vaccinated.	Poor.	Doubtful.	Modified.	"	
6	24	Childhood.	Not vaccinated.	.....	No pitting.	Unmodified.	"	
7	45	19 years.	Vaccinated.	Not noted.	Two or three doubtful scars.	Very mild.	"	Eruption consisted of only a few papules which never became vesicular.
8	28	2 years.	Not vaccinated.	.....	Well marked.	Greatly modified.	"	Vesicles few in number and dried up quickly; was ill only during the initial fever.
9	34	15 years.	Vaccinated.	Poor.	No pitting.	Unmodified.	Death.	
10	31	Childhood.	Not vaccinated.	.....	Some pitting.	Very mild.	Recovery.	Presents only three or four variolous vesicles.
11	20	"	Vaccinated.	Good.	No pitting.	Modified.	"	
12	20	10 years.	Not vaccinated.	.....	Doubtful.	Unmodified.	Death.	Three months pregnant; aborted on the first day of the eruption.
13	27	8 years.	Vaccinated.	Poor.	No pitting.	"	"	Confluent.
14	22	18 years.	"	Good.	"	"	"	Shows about half a dozen small scars, said to be the result of a previous attack; disease at present mild; only seven days in the hospital.
15	22	18 years.	"	Two good.	Very little.	Modified.	Recovery.	
16	13	3 years.	"	"	Slight pitting.	"	"	
17	17	Childhood.	"	No visible mark.	Some pitting.	Greatly modified.	"	Eruption not even vesicular.
18	18	14 years.	"	Poor.	Very little.	Greatly modified.	"	Eruption so mild as scarcely to be characteristic; four days in hospital.
19	18	6 years.	Not vaccinated.	.....	Some pitting.	Greatly modified.	"	Eruption very light.
20	28	10 years.	Vaccinated.	Poor.	Deeply pitted.	Greatly modified.	"	
21	15	Childhood.	"	Good.	No pitting.	Unmodified.	"	Thinks he had small-pox when a child.
22	30	25 years.	"	"	"	Modified.	"	Says his doctor called the alleged previous attack small-pox.
23	23	6 months.	"	"	Doubtful.	"	"	Says she was vaccinated when four weeks old.
24	14	3 years.	Not vaccinated.	.....	No pitting.	Unmodified.	"	Says her mother tells her she had small-pox when three years of age.
25	35	Childhood.	Vaccinated.	Three good.	Very little.	Modified.	"	Eruption only papular.
26	31	6 years.	"	Two poor.	Doubtful.	"	"	
27	24	18 months.	Not vaccinated.	.....	Deeply pitted.	Greatly modified.	"	
28	25	10 years.	Vaccinated.	Good.	Some pitting.	Modified.	"	Three months pregnant; aborted the first day of eruption. Eruption very mild.
29	19	7 years.	"	Poor.	Two small pits.	Unmodified.	Death.	
30	12	3 years.	"	No visible marks.	One or two pits.	Modified.	Recovery.	
31	21	Childhood.	Not vaccinated.	.....	No pitting.	Unmodified.	"	
32	24	16 years.	"	.....	"	"	Death.	
33	16	7 years.	"	.....	"	"	Recovery.	
34	21	13 years.	Vaccinated.	Good.	One pit.	Modified.	"	Two months pregnant.
35	22	8 years.	"	Two good.	No pitting.	"	"	Only a few variolous vesicles.
36	38	Childhood.	"	Fair.	"	"	"	
37	44	"	"	Poor.	"	"	"	Eruption barely vesicular.
38	41	31 years.	"	"	"	"	"	
39	31	11 years.	"	Very poor.	Doubtful.	Greatly modified.	"	
40	17	2 months.	Not vaccinated.	.....	"	Unmodified.	"	
41	21	6 months.	Vaccinated.	Poor.	No pitting.	"	"	
42	23	6 years.	"	"	"	Modified.	"	About eighteen pits on face. It is possible for these to have resulted from chicken-pox.
43	24	7 years.	Not vaccinated.	.....	Some pitting.	Unmodified.	Death.	Eruption only papular.
44	41	18 years.	Not noted.	.....	Well marked.	Greatly modified.	Recovery.	Says the alleged previous attack of small-pox occurred about the time she was vaccinated, and that two of her sisters had small-pox at the same time and are pitted.
45	50	2 weeks.	Vaccinated.	No visible marks.	No pitting.	Modified.	"	

The New York Medical Journal.

A WEEKLY REVIEW OF MEDICINE.

EDITED BY

FRANK P. FOSTER, M.D.

THE PHYSICIAN who would keep abreast with the advances in medical science must read a *live* weekly medical journal, in which scientific facts are presented in a clear manner; one for which the articles are written by men of learning, and by those who are good and accurate observers; a journal that is stripped of every feature irrelevant to medical science, and gives evidence of being carefully and conscientiously edited; one that bears upon every page the stamp of desire to elevate the standard of the profession of medicine. Such a journal fulfills its mission—that of educator—to the highest degree, for not only does it inform its readers of all that is new in theory and practice, but, by means of its correct editing, instructs them in the very important yet much-neglected art of expressing their thoughts and ideas in a clear and correct manner. Too much stress can not be laid upon this feature, so utterly ignored by the “average” medical periodical.

Without making invidious comparisons, it can be truthfully stated that no medical journal in this country occupies the place, in these particulars, that is held by THE NEW YORK MEDICAL JOURNAL. No other journal is edited with the care that is bestowed on this; none contains articles of such high scientific value, coming as they do from the pens of the brightest and most learned medical men of America. A glance at the list of contributors to any volume, or an examination of any issue of the JOURNAL, will attest the truth of these statements. It is a journal for the masses of the profession, for the country as well as for the city practitioner; it covers the entire range of medicine and surgery. A very important feature of the JOURNAL is the number and character of its illustrations, which are unequalled by those of any other journal in the world. They appear in frequent issues, whenever called for by the article which they accompany, and no expense is spared to make them of superior excellence.

Subscription price, \$5.00 per annum. Volumes begin in January and July.

PUBLISHED BY

D. APPLETON & CO., 1, 3, & 5 BOND STREET,

NEW YORK.

